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in Vol. II. The descriptive contributions of Blackwelder are an important factor of the investigation and give evidence at once of fidelity and skill. The systematic and philosophic treatment by Willis presents in lucid form the larger deductions of the investigation, embracing at once the stratigraphic, the physiographic, and the dynamic. Although the order selected for presentation in these volumes is the natural and logical one, some will find it serviceable to read the systematic summation and the salient conclusions of Vol. II first and seek the details on which they are based afterward.

The previous work, of Richthofen, Pumpelly, and others have given us some familiarity with the stratigraphic series of central China, and have thus taken the flavor of freshness from some of the important lines of this research, but new features of critical interest have been brought forth by this investigation, more, indeed, than could have been anticipated, and some of these are distinct surprises. The analysis of the deformations by physiographic, as well as stratigraphic methods, and the determination of geological stages by the former method are among the most notable contributions. These cannot be reviewed in detail here, nor would it be best if practicable, since they can be appreciated at their full value only by reading at length the elegant verbal and graphic expositions which they have received at the hands of an artist at once with pen, pencil, and camera.

Perhaps the most startling and, in many respects, the most significant of the results of the investigation was the discovery, on the Yang-tsī-kiang, in about the latitude of New Orleans, of a thick glacial deposit lying below the trilobite horizon of the Lower Cambrian. This discovery, supported by evidences of similar formations at approximately the same horizons, as it would appear, in distant parts of the earth, added to Coleman's recent determination of a still earlier glacial formation at the base of the Huronian in North America, and supported by the general deductions from cosmogonic and physical data that have recently been advanced, makes it clear that a radical reversal of ancestral ideas as to atmospheric evolution and early climatic history is upon us.

The admirable topographic work of Sargent furnishes an excellent basis for the stratigraphic mapping and the physiographic induction.

T. C. C.

Glaciers of the Canadian Rockies and Selkirks. By WILLIAM HITTELL SHERZER. Smithsonian Institution, 1907. Quarto, pp. 135.

This elegant volume gives the results of a systematic examination of the Victoria and Wenkchemna glaciers in Alberta and of the Yoho, Asulkan, and Illecillewaet glaciers in British Columbia. The study embraced the

surface features of these glaciers, the nature of the ice movement, the temperature of the ice at various depths and its relations to the air temperatures, the amount of surface melting, the possible transference of material from the surface portion to lower portions, the rates of movement, the advances and recessions of the glacial extremities, and the structure of the ice. There is an accessory discussion of the physiographic changes of the region in Pleistocene and earlier times.

The points that stand out most in the discussion are those which relate to the precipitation of snow and rain, the effects of climatic cycles on glacial movements, the stratification and granulation of the ice, its shearing planes, blue bands, and the possible methods of their development. A notable result is the demonstration by daily measurements of the shearing of layers of ice over one another, a phenomenon announced by Chamberlin as a result of his Greenland observations, but questioned by Russell and others. The conclusions relative to glacial movement lie essentially in the lines toward which the more critical recent studies by different investigators seem to be quite surely tending, a composite mode of motion embracing as factors of varying efficiency granular growth, granular inter-movement, shearing of the sliding planes of the ice crystals, and shearing of the glacial layers over one another. An unsatisfactory flavor is given this by an effort, italicized as though important, to make plasticity mean something which plasticity does not usually mean, for no other apparent reason than to justify the retention of an old term which is likely to be either misleading or meaningless. The movement of the gliding planes of an ice crystal over one another is a plastic movement only in the forced sense that the sliding of cards in a pack, or of boards in a lumber pile, is a plastic movement, and such a movement is better called something else.

The work is very amply illustrated by excellent photographs and maps, and is an important contribution to glacial science.

T. C. C.

The Fauna of the Salem Limestone of Indiana. By E. R. CUMINGS, J. W. BEEDE, E. B. BRANSON, and ESSIE A. SMITH. Thirteenth Annual Report of the Department of Geology and Natural Resources of Indiana, 1906. Pp. 1187-1487, 47 plates.

The Salem limestone of Indiana is known generally to geologists and business men as the Bedford limestone, receiving its name from the town at which are located so many of the large quarries of this formation; but the name was preoccupied when given to this limestone, since Bedford had